

**Vectren Energy Delivery's Response  
to the Indiana Utility Regulatory Commission's  
Electric Service Quality Rulemaking Power Quality Data Request**

**Request date: December 5, 2003**

**Reply date: January 13, 2004**

**1. From a customer's perspective, how are power quality problems usually described/identified, i.e. what does the customer complain about?**

Complaints from customers are varied over a broad spectrum. The description of the problem can be accurately reported but often is described in vague non-technical terms. Table I. is a random list of typical customer complaints and the possible classification as defined in IEEE Std1159-1995(R2001) *IEEE Recommended Practices for Monitoring Electric Power Quality*.

Table I.

Customer's Complaint or Symptom	Transient	Sag	Swell	Undervoltage	Overvoltage	Voltage Flicker	Harmonic Distortion	Noise	Interruptions	Voltage Imbalance
Flickering Lights		x	x			x			x	
Dim Lights		x		x						
Lights Bulbs burnout	x		x		x					
Frequent Fuse Failures	x			x	x		x			
Circuit Breaker Trips	x			x	x		x			
Motor Failures	x			x	x					
Equipment Malfunctions	x	x	x	x	x	x	x	x	x	x
Lightning Damage	x									
Power interruptions		x		x					x	
Power Surges	x	x	x			x			x	
Damaged Appliances	x			x	x					
Low Voltage		x		x						
High Voltage			x		x					
Voltage Imbalance				x	x					x

**2. Are the complaints and/or problems different for residential or small commercial customers versus large commercial or industrial customers? If so, please explain how the complaints are different.**

Customer's descriptions of complaints can vary widely between customer types. Power quality problems types do vary between classes of customers. Voltage imbalance between phases only affects three phase customers who are typically commercial or industrial customers. Complaints related to voltage sag, electrical noise and harmonics are usually limited to industrial customers. Residential customers complain most frequently about momentary outages of service. Also, they frequently misuse technical jargon. If the customer is not carefully questioned and their responses carefully evaluated the wrong problem may be investigated.

**3. What steps does your utility take to address power quality complaints?**

Most complaints are referred from the customer call center to Electric Dispatch. An electrical line specialist (ie: lineman) is usually sent to initially investigate the customer complaint. This investigation can reach four possible conclusions:

- 1 Identify the problem and correct it.
- 2 Identify the problem and refer it other specialists in the company for solution.
- 3 Not identify the source of the problem and refer it to the Electrical Test Engineer for further investigation.
- 4 Determine that it is a customer problem.

The electrical test engineer response varies with the specifics of each complaint. In most cases spot checks are made of the supply voltage at the service points along with an examination for any obvious problems. If no problems are identified a test recorder instrument is installed and the service monitored. Monitoring times vary from just a few hours to several weeks. The electrical test engineer evaluates the data collected and the test engineer determines the appropriate action taken to mitigate the problem. The electrical test engineer investigation has four possible conclusions:

- 1 Find that problem is caused by the utility. Write a maintenance order to repair or replace faulty or inadequate utility equipment or systems.
- 2 Find that the problem is internal to the customer and not a utility problem. Suggest to the customer power quality consultants who can aid the customer in solving their problem.
- 3 Find that no corrective action is necessary.
- 4 Refer the problem to the utility engineering department for resolution.

On occasion we have provided assistance to industrial customers in locating the origin of power quality problems within their facilities. We have suggested general methods for correction of problems to customers that have problems within their facilities. We have also aided customers in locating consultants to address their internal power quality problems.

- 4. Does your customer call center categorize power quality complaints separately?**
- If so, how many power quality complaints have there been in the last 12 months? How were these complaints resolved?**
  - If not, please estimate how many power quality complaints there has been over the last 12 months and how they were resolved.**

Power quality complaints are not categorized separately by the call center. Also, complaints come in from other sources such as Industrial and Commercial Representatives and field personnel. Power quality complaints are a subset of larger class complaints that require physical investigation in the field. Other types of complaints within this group would be electric interruptions, reports of damaged facilities, and radio and television interference complaints. All complaints of this nature are referred to the Electric Dispatch Department.

Complaints not resolved by Electric Dispatch are referred to the Electrical Test Engineer. The total number of these escalated inquiries (complaints) for 2003 was 76. Of this total, 65% were identified as non-Vectren system issues. For those that were related to the Vectren system, generally the resolutions can be divided into two categories. The first is the repair or replacement of defective equipment. The second is strengthening the supply.

**5. Are there actions that customers can take to insulate their equipment from power quality problems? If so, please explain what actions could be taken.**

Customer can install surge suppressers on their electronic equipment to reduce the risk of damage caused by voltage transients. They may wish to install uninterruptible power supply (U.P.S.) on critical equipment to prevent problems associated with sags and short outages. Other actions may involve reactors, capacitors and soft start motor controls. Customers utilizing three-phase power may install loss of phase relays to protect motors from failure due to loss of phase.